

REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Claims 14-39 have been withdrawn from consideration. Claims 1-13 remain active in the application, of which Claims 10 and 13 recite subject matter which has been indicated as being patentable. Claims 1 and 8 have been amended, based upon the interview discussed below, to recite that the "basic output characteristic of the fuel cell" is "predetermined," i.e., that it is determined prior to the estimation of the output characteristic of the fuel cell.

Applicants wish to thank Examiners Martin and Chaney for the courtesy of an interview on February 11, 2004, at which time Claims 1, 2 and 8 were discussed in conjunction with the applied prior art to Freeman et al. (U.S. patent 6,519,539). In view of the discussion held at that time, the Examiners indicated that the rejection based upon Freeman et al. would be reconsidered.

As discussed during the interview, the claimed invention is directed to a fuel cell output characteristic estimating apparatus, or a fuel cell system incorporating such an apparatus. As is set forth in Claim 1, for example, the apparatus includes a current-voltage detector that detects an output current of the fuel cell and a voltage between the terminals of the fuel cell, and a controller that estimates the output characteristics of the fuel cell on the basis of the detected output current and voltage, as well as a basic output characteristic of the fuel cell. For example, referring to the nonlimiting embodiment disclosed in the specification, a fuel cell system is provided with a voltage sensor 54 and a current sensor 56 which respectively detect the voltage and current outputted from the fuel cell 26.

Additionally, a basic output characteristic is calculated at step S104 (Figure 2). For example, as is described on pages 10-12 of the specification, a basic output characteristic V1 can be obtained based upon a theoretical output characteristic V0 and a basic internal resistance R0

(see equation 1). Subsequently, an output of the fuel cell (e.g., V2) can be estimated on the basis of the basic output characteristic (equation 2).

As was discussed during the interview, while the basic output characteristic recited in Claim 1 is not restricted to the basic output characteristic V1, Claim 1 nonetheless requires that the controller estimate *an output characteristic* of the fuel cell on the basis of a predetermined basic output characteristic. This is not taught or suggested by Freeman et al.

For example, Freeman et al. is directed to the measurement of fuel cell impedance (column 1, lines 32-34; column 3, lines 57-60). In doing so, the actual voltage and current being outputted from the fuel cell are detected (column 4, lines 49-52; column 5, lines 51-55). However, these measured outputs are used to calculate the impedance of the fuel cell (see paragraph bridging columns 5 and 6). As discussed during the interview, *the impedance of the fuel cell is not an output characteristic of the fuel cell* – the impedance is not outputted from the fuel cell. Thus, the mere determination of the impedance is not the claimed estimation of the output characteristic of the fuel cell.

Nor is there any suggestion in Freeman et al. that an output characteristic of the fuel cell should be estimated, based upon a basic output characteristic. Rather, the teaching of Freeman et al. is limited: determine the fuel cell impedance. Freeman et al. this fails to anticipate Claim 1 which recites a “controller that estimates the output characteristic of the fuel cell” on the basis of factors including a predetermined basic output characteristic. Freeman et al. would also fail to render Claim 1 obvious since Freeman et al. is not concerned with an output characteristic of the fuel cell.

Dependent Claim 2 further recites that the controller derives the basic output characteristic from at least one of a fuel supply pressure applied to the fuel cell and a temperature of the fuel cell. An example of this is described in paragraph 0037 and Figures 4-5. As was further discussed during the interview, while Freeman et al. recognize that the

fuel cell impedance is affected by factors including the fuel cell temperature and the fuel flow rate (column 6, lines 47-56), this is merely a general statement of a relationship between internal impedance and operating parameters, not a teaching that an estimate of an output characteristic of the fuel cell (as opposed to the internal impedance) should be based upon these factors. For these reasons as well, the dependent Claim 2 also defines over Freeman et al.

Dependent Claim 4 further recites that the controller estimates the internal resistance (e.g., R_1) of the fuel cell on the basis of the detected output current (e.g., I) the detected voltage between the terminals and the basic output characteristic (e.g., V_1), and estimates the output characteristic (e.g., V_2) on the basis of the estimated internal resistance of the fuel cell. None of the specifics of the estimation recited in Claim 4 are taught or suggested in Freeman et al.

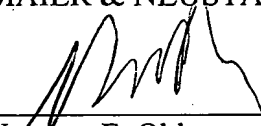
Claim 8, like Claim 1, recites estimating an output characteristic of the fuel cell on the basis of the detected output current and the detected voltage between the terminals, and a predetermined basic output characteristic of the fuel cell. Claim 8 therefore also defines over Freeman et al. for the reasons discussed above with respect to Claim 1. Additionally, Claim 8 recites adjusting the output of the fuel cell such that a target output set using the output characteristic estimated by the controller is generated by the fuel cell. This is shown, for example, in Figure 8 and described in paragraphs 0046-0048. The adjustment of a fuel cell output according to the estimated output is not taught or suggested in Freeman et al. Claim 8 and its dependent claims therefore clearly define over this reference.

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Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early notice of allowability.

Respectfully submitted,

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